

Uva Wellassa University of Sri Lanka
Faculty of Science and Technology
Department of Science and Technology
400 level 1st Semester Examination – June / July 2017
SCT466-2 Intelligent Systems



Instructions to candidates:

Duration: Two (02) hours

Number of questions: Four (04) Essay Questions

Mark allocation: 100 mark

Answer all questions.

1.
 - a. Discuss, why the community developed fear against Artificial Intelligence (AI) approach in the early era. (3 mark)
 - b. Explain the concept 'Rationality' under the 'Four Schools of Thoughts' in AI using appropriate examples. (5 mark)
 - c. List four (04) remarkable happenings reported from the history of Artificial Intelligence. (8 mark)
 - d. Explain how the concepts associated with 'Turing Test' can be further extended in order to evaluate the modern intelligent systems. (4 mark)
 - e. Suggest how Artificial Intelligence based implementations will assist to improve the functionalities of the human brain. (5 mark)

2.
 - a. Classify the search algorithms based on the availability of prior knowledge before initiating the search. (5 mark)
 - b.
 - i. List four (04) uninformed search algorithms. (4 mark)
 - ii. Compare and contrast any three (03) search algorithms listed above according to the typical evaluation criteria. (9 mark)
 - c.
 - i. Discuss the importance of Heuristic Search Algorithms. (3 mark)
 - ii. Explain the Greedy Search Algorithm using an appropriate example. (4 mark)



3.

- a. Map the major genetic operations identified in genetics to the computational Genetic Algorithm (GA). (5 mark)
- b. What are the two (02) major types of Genetic Algorithms? (4 mark)
- c. Explain the different types of mutations occur in Genetic Algorithm using appropriate examples. (5 mark)
- d.
 - i. List three (03) selection techniques applicable for a genetic algorithm except Fitness Proportionate Selection (FPS). (3 mark)
 - ii. What are the major drawbacks of Fitness Proportionate Selection? (3 mark)
 - iii. Discuss the unique approaches adopted by each selection technique listed in part i. as an attempt to rectify the issue identified in part ii. (5 mark)

4.

- a. An electrical motor attached to an automated flood control system is driven based on the input fuzzy membership function (water level of the reservoir) illustrated in Figure 01.

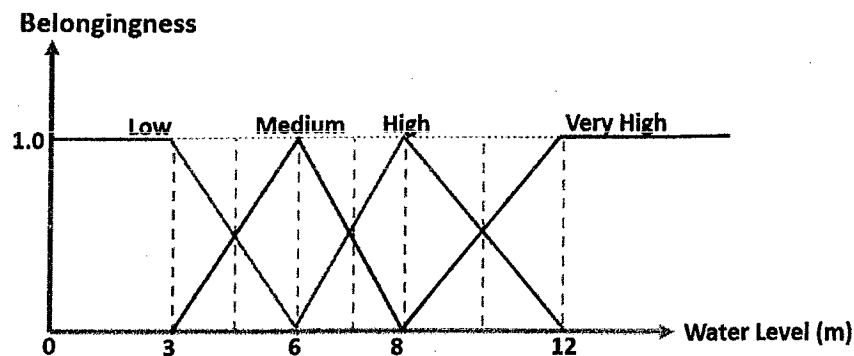


Figure 01: Input fuzzy membership function (Water level in meters)

The following set of fuzzy rules are used to determine the revolutions per minute (rpm) of the motor:

- IF **Low** then **Slow**
- IF **Medium** then **Average**
- IF **High** then **Fast**
- IF **Very High** then **Maximum**

The corresponding rpm values for each input value is referred from an output fuzzy membership function given in Figure 02.

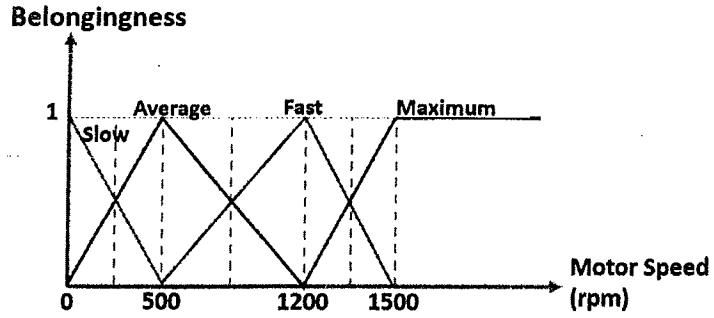


Figure 02: Output fuzzy membership function (speed of the motor)

Find the corresponding rpm values of the motor for the following water levels:

- | | |
|------------|-------------|
| i. 2.5 m | iv. 10.25 m |
| ii. 4.5 m | v. 14 m |
| iii. 6.3 m | |

(15 mark)

- b. Design a better closed loop control system by combining fuzzy logic and the control theory.
(Hint: Let fuzzy to determine the coefficients of Proportional-Integral-Derivative (PID))

(10 mark)